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| **Course Code** | | **MEE428 Real Time Control** | | | |
| **Homework #2** | | **Reading Encoder and Driving DC Motor in Real Time** | | | |
| **Related Learning Outcome:** | | **2** | | | |
| **Group Number:** | |  | | | |
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| **Grading** | | | | | |
| Q1 (50%) | | | | Q2 (50%) | |

Due Date: 23.03.2024

Needed software

* MATLAB 2021a or newer
* Matlab Simulink Support Package for Arduino Hardware Needed hardware
* Arduino UNO
* Potentiometer
* DC Motor with Encoder
* DC Motor Driver

1. By using “*Matlab Simulink Support Package for Arduino Hardware*”, connect a potentiometer and a DC Motor driver to appropriate pins of Arduino UNO. Read analog input value of a potentiometer and set DC Motor voltage in accordance with 10-bit analog value of the potentiometer in real time with external mode. Count the encoder pulses by using external interrupt block and determine the real time velocity of the DC Motor. Show the 10-bit analog value, PWM percentage that is utilized to DC Motor terminals, encoder pulses and determined velocity value on real time plots.
2. With the same model that is utilized in Question – 1, add absolute position real time graph, which works in bi-directional. Calibrate the potentiometer input to give bi-directional input to the DC Motor voltage.

**INTRODUCTION**

This project involves creating a control system using Arduino UNO, potentiometer, DC motor with encoder and DC motor driver. The purpose of the system is to read the analog signal coming from the potentiometer, convert this value into an 8-bit digital value (PWM signal) and adjust the voltage applied to the DC motor using the obtained value. It also involves counting encoder pulses using an external interrupt block to determine the real-time velocity of the DC motor.

**ANSWERS**

Q1)

The potentiometer acts as the input device by providing a 0 to 10 bit analog value representing the desired motor speed or position. This analog value is read by the Arduino UNO and the voltage applied to the DC motor is adjusted and used to control the DC motor speed.

We use an encoder connected to the motor shaft to monitor the velocity of the motor. The encoder generates and counts pulses using an external interrupt block in Simulink as the motor rotates. By analyzing the time between these pulses, the real-time speed of the DC motor is determined.

A computer screen shot of a computer

Description automatically generated

The system is controlled with the blocks given above, but we could not get the output we wanted. The output we wanted to get was as follows. We couldn't figure out what caused the problem..

A graph with blue and yellow lines

Description automatically generated

**CONCLUSION**

Although we did not get the output we wanted, we aimed to obtain the following results. Control and monitoring of the system is provided using Simulink models running in external mode, allowing us to interact with Arduino UNO in real time. We wanted to display the analog value from the potentiometer, the PWM percentage used to drive the motor, and the encoder pulses in real-time graphs.